

Nanotechnology (NT): Carbon Nanotube Structural Materials

Completed Technology Project (2013 - 2016)



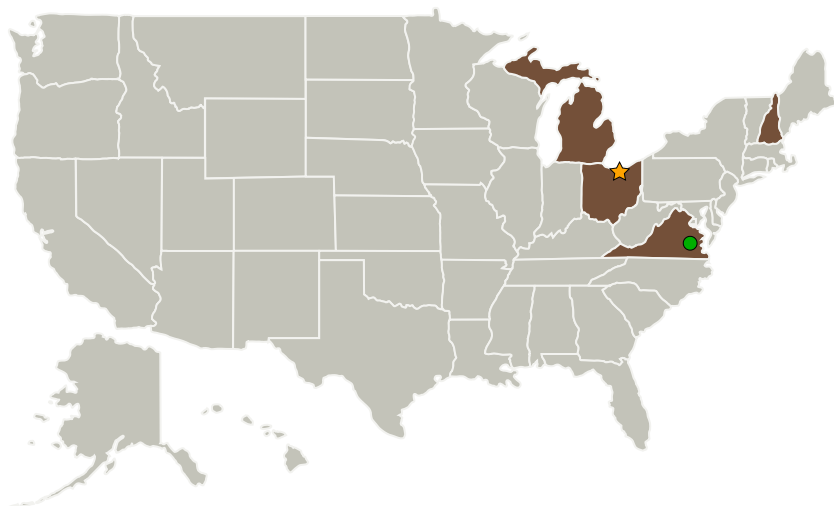
Project Introduction

Increase the tensile strength of CNT fibers to produce composites with specific tensile strengths of 2.0 GPa/(g/cc) and demonstrate their impact on the mechanical properties, coefficient of thermal expansion, and damage tolerance of CFRP Approach: Increase tensile strength of commercially available CNT materials via a combination of processing modifications (increased CNT length and improved alignment) and post-processing methods (increase CNT-CNT bond strength) Incorporate into composites and perform coupon level tests to quantify improvements in mechanical properties, damage tolerance and dimensional control Demonstrate benefits and flight readiness by design, fab, ground and flight test of a CNT reinforced COPV Partner with DoD and other agencies under the NNI Sustainable Nanomanufacturing Signature Initiative to leverage resources and capabilities Utilize other NASA investments, e.g., Space Technology Research Fellowships, SBIR/STTR to accelerate technology development

Anticipated Benefits

•20% reduction in CFRP panel weight •100% improvement in damage tolerance

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Game Changing Development

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Organizations Performing Work	Role	Type	Location
★ Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Kent State University at Kent	Supporting Organization	Academia	Kent, Ohio
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia
Michigan Technological University(MTU)	Supporting Organization	Academia	Houghton, Michigan
Nanocomp Technologies	Supporting Organization	Industry	

Co-Funding Partners	Type	Location
Air Force Office of Scientific Research(AFOSR)	US Government	Arlington, Virginia

Primary U.S. Work Locations	
Michigan	New Hampshire
Ohio	Virginia

Project Website:

<https://www.nasa.gov/directorates/spacetech/home/index.html>

Project Management**Program Director:**

Mary J Werkheiser

Program Manager:

Gary F Meyering

Principal Investigator:

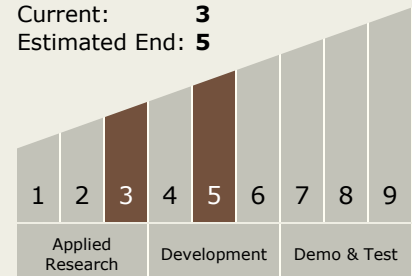
Peter T Lillehei

Co-Investigator:

Emilie J Siochi

Technology Maturity (TRL)

Start: 3
Current: 3
Estimated End: 5

**Technology Areas****Primary:**

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - TX12.1 Materials
 - TX12.1.1 Lightweight Structural Materials